belts, the difference increasing in the more southerly latitudes. In rate of increase they stand between the other two divisions. The topography of these hilly, coal counties is a sufficient cause for their lower yield, and is probably the chief cause, as the rocks of the coal measures comprise both limestones and shales, and it is probable that the soils derived from them are not naturally inferior in fertility to those found in the remainder of the State.

As between the soils lying over limestones and those over shales, these statistics do not yet justify any opinion regarding their respective adaptation to the production of wheat. It is probable, however, that the middle and southern belts of counties afford a more just basis of comparison between the two geological formations than the northern belt, because in this northern region the overlying drift has been derived, to a large extent, from the rocks excavated from the lake basin, and which are both limestones and shales.

Within twenty years the area annually sown to wheat in Ohio has increased from an average of 1,800,000 acres during the eighth, to 2,500,000 acres during the ninth decade. This area represents twelve per cent of the area in farms within the State, but several counties are sowing annually 18 to 20 and even 25 per cent of their farm lands to wheat. In 1881 a total area of 2,800,000 acres was sown, and there is no good reason to doubt that with the continued clearing away of the forest and the reclamation of waste lands by drainage it will soon be possible to devote as much as 3,000,000 acres to wheat without infringing upon any other agricultural interest, and this, even though the hill counties should reduce their acreage by one-half. Such an increase, at the present rate of production, would represent an annual product of 40,000,000 bushels.[1]

But it is not to be supposed that Ohio farmers will rest content with a yield of only thirteen bushels of wheat per acre. The northern third of the State has increased its average yield within forty years by nearly three bushels, and the middle third by from one to two bushels, and it is reasonable to expect a similar increase within the next forty years, notwithstanding the fact that the rate of production seems just now to be at a standstill. It is to be expected that progress in this, as in other matters, will be more or less spasmodic, and that its actual rate can only be measured at long intervals; but it is not impossible that the time may come when the average from the entire State will equal the present average of Summit county, which means a total average production of about 60,000,000 bushels, or bread for twelve million mouths. Such a yield would be far below what has been attained in Great Britain, where the average yield is now 28 bushels or more per acre and is steadily increasing. This high yield is not due solely to the superiority of the soil and climate of that country, for the time has been when the average yield of Great Britain was very much smaller than it is at present.

Ohio's population has increased by a little more than two millions since 1850, while the total wheat yield has increased by an average of more than 14,000,000 bushels per annum, comparing the average of the first decade with that of the decade 1850–9, so that production is keeping far ahead of any possible consumption within the State. Production will eventually reach a limit, while population may expand indefinitely, but at present rates of increase, both of population and of wheat production, it will probably be several centuries before Ohio shall contain enough people to consume all her wheat.

[1] 48,000,000 bushels were harvested in Ohio in 1888.

What is true of Ohio is true to a greater or less extent of the entire winter wheat belt of North America. The area now sown to wheat in this region may be expanded largely without infringing upon other productions, and the rate of yield may and will be very materially increased by better husbandry, including an intelligent use of manures and fertilizers, and more thorough drainage.

Let there be given a little stimulus in the shape of higher prices for wheat and we shall see a rapid expansion in the total production in this country, while there are still undeveloped regions in South America, south Africa, and Australia, which will eventually be made to add largely to the world's supply of breadstuffs.

This is not said by way of discouragement. I believe that the future outlook for the Ohio wheat grower is eminently a hopeful one, but I do not expect to see the very great increase in price of wheat that is being predicted by certain statistical writers. In my judgment, the great opportunity for the Ohio wheat grower lies in increasing the yield per acre, in reducing the cost of production, and in improving the quality of the grain. Such a course will render him independent of the market, and then if higher prices do come he will be doubly benefited.

It appears from this statistical study of the wheat harvests of Ohio that the average yield of wheat is increasing in the northern and central sections of the State, while it is at a standstill, and standing at far too low a point for profit, in the southern and south-eastern counties.

It would seem that the profitable culture of wheat on the steep hillsides of southern Ohio is a hopeless undertaking; that the great problem before the wheat grower of the central belt of counties is winter-killing, a problem which may be partially solved by underdrainage and the intelligent use of clover and manures; and that in the northern counties climatic influences are more generally favorable to wheat culture than elsewhere in the State.

The statistics indicate that the wheat crops of Ohio have been slightly increased by the use of commercial fertilizers, but it appears that the average cost of this increase has equaled its market value, and that a general improvement in the methods of agriculture has contributed more largely to the increase of Ohio's wheat crops than the use of purchased fertility.

It would seem that the total area under wheat might be considerably enlarged, and at the same time more closely restricted to lands adapted to tillage, and that the yield per acre may be so increased that the total product shall reach double the quantity now annually produced.

CHAS. E. THORNE.

THE ANTHROPOLOGY OF EUROPE.

"THE Anthropology of Europe" was the title of a course of lectures (the Rhind lectures) delivered in Edinburgh last October by Dr. Beddoe, ex-president of the Anthropological Institute of Great Britain, of which we find the following brief abstract in the *Scottish Geographical Magazine:* Dr. Beddoe, in his earlier lectures, dwelt chiefly on some of the problems of anthropology, briefly on the question of priority of dolichocephalic or brachycephalic types, briefly also on the great Aryan question, and at greater length on that of the influence of environment, towards modifying of types, to which he repeatedly referred during subsequent lectures. He noted the very frequent occurrence of broad, even very broad, skulls in conjunction with very narrow ones in some of the earlier, if not the earliest, "finds," a circumstance not

yet sufficiently explained. He showed that we knew very much more about the succession of races and the details of ethnography, where these related to western Europe, especially to France, because these parts were inhabited, owing to the geological conditions, earlier than the north-eastern portions of Europe, while in the east and south-east generally, and in Spain, anthropological science was not sufficiently advanced, or political circumstances intervened, and investigators were few. With respect to the Aryan question, he pronounced no very decided opinion, though he spoke of certain doctrines on the original habitat as the Scandinavian and Lithuanian heresies; and he showed some inclination towards that view which looks on the Galchas as representing the ancestors of the Iranians and of the people who brought the Aryan languages into Europe, in which case the brachycephals of the central mountain chains, the Carpathians with the Balkans, Bohemian Mountains, the Alps, Jura, Vosges, Cevennes, etc., may be looked on as retaining much of the original Aryan blood, seeing that their physical characteristics have a general resemblance to those of the Galchas. He discredited the argument that because the Aryan-speaking inhabitants of Europe were more numerous than those of Asia, it was much more easy to derive the latter from the former, the less from the greater, than *vice versa*, remarking that on the same principle we should derive the English from North America and the Portuguese from Brazil, and that it was not at all unlikely that about the dawn of history, when Asia was thickly and Europe comparatively thinly peopled, the proportions were quite different, especially as at that time the Iberians were still unorganized as to language. With regard to the influence of environment he quoted Kollmann of Basel's five types: —

1. Long-headed long-faced, the Grave-row or Germanic, etc.,
2. Broad-headed long-faced, the Disentis or Sarmatic,
3. Long-headed broad-faced, the Cro-Magnon,
4. Broad-headed broad-faced, the Turanian,
5. Mesocephalic broad-faced,

but said he thought the types too few and the limits too absolute and precise as to figures.

He showed the extreme divergence of views on this subject of environment, — noting how Kollmann denied any change of types, or material progression therein, since the period when we knew anything of man in Europe, saying that man was fit for anything when he first appeared here, and that for the establishment of permanent varieties we must look further back, perhaps even into the Miocene age.

On the other hand, Schaaffhausen, Ranke, and, to a less decided extent, perhaps Virchow himself, assign very great importance to environment. The first indicates a large number of points of inferiority as occurring together or separately in the old dolichocephals, and believes that in Germany, if not elsewhere, heads are gradually growing broader with increasing intelligence and civilization, while Ranke thinks that in Bavaria, in some unexplained way, the inhabitation of mountain regions has a tendency to broaden and shorten the head, and that, where race concurs with environment, as as in the once-slavonic hill-country of Upper Franconia, the tendency is still more marked, as from a double influence. Dr. Beddoe then went briefly through the history of the successive expansions and "swarmings" or migrations of the several races who have successively been active in Europe,— the Phœnicians, the Greeks, the Gallo-Kelts, the Romans, the Germans, the Slavs, the Saracens, and the Turco-Tartar tribes, and their share in modifying race-distribution.

Proceeding to consider the history and ethnology of Russia, he stated his opinion that the Scythians, if not altogether Turanian, were a mixed race into which a Turanian element entered, and who ruled over other tribes of different descent from themselves. The ancient skulls had not been found or preserved in great number, but they were almost all long, up to the Slavonic period, when they became rather broad, very much what they are at the present day. The Merians around Moscow were a Finnish tribe, who about the tenth or eleventh century were being subdued or incorporated by the encroaching Muscovites, and who finally disappeared; they were tall and strong, but pacific in habits, and, though they had commerce with the Arabs and Bulgarians, were comparatively poor. The history of Russia was one of gradual absorption of Finnish tribes, interrupted for a long period by the great invasion and domination of the Mongols of the Golden Horde. The numerous Finnish tribes seemed to have something common in their physiognomy, but differed very much in their indices of head-breadth, and also to some extent in complexion, some having dark hair, others to a large extent fair or brown, and some a large percentage of red hair, e.g., the Votiaks and Voguls, who are incorrectly said to be all red-haired.

Dr. Beddoe thought the Illyrians probably furnished the principal source of the black-haired folk in the Balkan Peninsula; they were also broad-headed. He entered into some details as to the changes in the Greek type and the history of the Thracians, as well as of the colonization of Bulgaria by the people who now bear that name.

With regard to Scandinavia he quoted the discrepant views of Montelius and Aspelin, the former doubting or denying the arrival of any new race since the neolithic period, the latter tracing the true Swedes to the Rhoxalani (Red-men in Finnish), whom he supposed to have entered Sweden about the fourth or fifth century.

In treating of Germany he entered pretty fully into the question of the change which appears to have taken place in the physique of the Bavarians and Swabians since the Marcomanni and Alemanni occupied these countries, quoting the different opinions of Von Hölder and Ranke on the subject, and especially the investigations of the former at Ratisbon.

In France and Belgium the clearest and most conclusive mass of anthropological fact was supplied by the investigations of Vanderhindere and Houzé into the color, head-form, stature, etc., of the Belgians. A line drawn east and west between the Flemings and the Brabanters and the Walloons separated two races differing in language, color, stature, head-form, and length of nose, and that in the sharpest manner. In France Dr. Beddoe also mentioned the inquiries of Broca and Boudin into stature, of Topinard into color, and of Collignon into head-form, and their remarkable results; and in Spain those of Don Telesforo de Aranzadi y Unamono, into the physical characteristics of the Guipuzcoan Basques, whom he believed not to be a pure race, but a mixture of three distinct elements. In Italy he showed how the stature and the head-breadth decreased gradually from north to south, and how the Sards were probably the purest breed in Europe, and the best representatives of the Mediterranean or southern race; also how closely the modern seemed to resemble the ancient Romans. In Britain he selected for special remark Pembrokeshire and the Isle of Man, and analyzed the indications of stature, color, and head-form in the Manxmen, who were a cross-breed between the Gael and the Norseman in all these respects. In Scotland he selected for special remark the people of Berwickshire and of Ballachu-

lish, showing that, though not very dissimilar in head-form, they were strongly distinguished in color of hair. He expressed his belief in the presence of a Finnish or Ugrian element in the population of Scotland, which was also found in Wales, and was marked among other characteristics by oblique eyes. The Iberian element, which had doubtless been strong among the Picts, continued to be so in many parts of Scotland, for example, in Wigtownshire and the upper part of Aberdeenshire, and in a great part of the Highlands.

The concluding part of the last lecture was devoted to an appreciation of the three (or, counting the Finns, four) great races which now divide Europe, of which the central, Alpine, brown, thick-set, broad-headed race seems the one most likely to spread at the expense of its neighbors. The question of race *versus* environment was also summed up, to the advantage, on the whole, of the former.

THE ABORIGINAL NORTH AMERICAN TEA.[1]

THERE is a shrub or small tree, a species of holly (Ilex cassine), growing in the Southern States along the seacoast, not extending inland more than twenty or thirty miles, from Virginia to the Rio Grande. Its leaves and tender branches were once used by the aboriginal tribes of the United States in the same manner as the Chinese use tea and the South Americans use maté. But while the use of *Thea sinensis* and *Ilex paraguayensis* still survives, the use of the shrub above mentioned has been almost abandoned by our native Indians and by the white people who once partially adopted it as a beverage.

The reason for its disuse is hard to discover, for, in common with tea and maté, it contains caffeine, or a similar alkaloid. The object of this paper is to examine its history, to suggest its restoration to a place among the stimulant beverages, and to inquire into its possible economic value.

I have been able to trace its use as a beverage back to the legendary migration of the Creeks from their supposed far western home to the seacoast of the Carolinas. Whether it was used by the prehistoric mound builders is a question which may not at present be solved. But some archæologist of the future may find in the remains of the mound-builders or their predecessors proof of its use among them.[2]

The leaves and young tender branches were carefully picked. The fresh cassine was gathered at the time of harvest or maturity of the fruits, which was their New Year. The New Year began with the "busk," which was celebrated in July or August, "at the beginning of the first new moon in which their corn became full eared," says Adair. The leaves were dried in the sun or shade and afterwards roasted. The process seems to have been similar to that adopted for tea and coffee. The roasting was done in ovens, remains of which are found in the Cherokee region, or in large shallow pots or pans of earthenware, such as the Indian tribes made.

These roasted leaves were kept in baskets in a dry place until needed for use. Loudonniere (1564) writes of being presented with baskets filled with leaves of the cassine.

Was it an article of commerce? There seems to be no doubt on this subject. Allusions to the drinking of the "black drink" are found, indicating its use among tribes residing at a long distance from the habitat of the cassine.

Lawson (1709) writes of its being "collected by the savages of the coast of Carolina, and from them sent to the westward Indians and sold at a considerable price." Dr. Porcher, author of the "Resources of the South," says: "The Creek Indians used a decoction of the cassine at the opening of their councils, *sending to the seacoast for a supply*," and adds that the coast Indians sent it to the far west tribes. How far its use extended northward, I cannot ascertain. From some allusions of the early French writers, I think it was used by the Natchez, and that it was sent up the Mississippi from the coast of Louisiana. The Indians of Wisconsin, Illinois, and westward, used a decoction of willow leaves as a beverage, but I cannot find that they used it in ceremonials, or that it was looked upon with the same reverence.

It appears from the accounts of various early writers that there were several methods of preparing the black drink.

(1) The decoction made of the fresh leaves and young branches.

(2) A decoction of the dried and roasted leaves. It is probable that the leaves during roasting developed new qualities, as the roasting of coffee brings out the aromatic odor due to a volatile oil.

(3) A decoction which was allowed to ferment. In this condition it became an alcoholic beverage, capable of causing considerable intoxication, similar to that caused by beer or ale.

The early history of the use of *Ilex cassine* as a beverage is lost in the darkness of prehistoric ages. Probably the same can be said of tea, coffee, maté, and cocoa. But it is a singular fact that while all the latter beverages still continue to be used in the countries where they are indigenous, as well as all over the world, the use of cassine is nearly extinct, as it is now only used occasionally in certain important religious ceremonies by the remnants of the Creek Indians, and will disappear with them unless rescued by chemical research and its use revived for hygienic or economical reasons.

The very earliest mention of cassine was made in the "Migration Legend of the Creek Indians." This curious legend has been lately published by A. S. Gatschet of the Bureau of Ethnology, Washington, D.C., with text, glossaries, etc. In his preface he says: "The migration legend of the Kosihta tribe is one of the most fascinating accounts that has reached us from remote antiquity and is mythical in its first part." This tribe was a part of the Creek nation. Its chief, Tchikilli, read the legend before Governor Oglethorpe and many British authorities in 1735. It was written in red and black characters (pictographic signs) on a buffalo skin. This was sent to London, and was lost there; but, fortunately, a text of the narrative was preserved in a German translation.

It begins by narrating that the tribe started from a region variously supposed to be west of the Mississippi, or in southern Illinois, or southern Ohio. They travelled west, then south, then south-east, until they reached eastern Georgia. Here they met a tribe, called in the legend the "Palachucolas," who gave them "black drink" as a sign of friendship, and said to them, "Our hearts are white, and yours must be white, and you must lay down the bloody tomahawk, and show your bodies as a proof that they shall be white."

This was evidently the first knowledge the Kosihta tribe had of this beverage.

The black drink made by the Seminoles is described as "nauseous to the smell and taste, and emetic and purgative." It is a mixture and not brewed of the cassine alone. All our beverages, such as tea, coffee, maté, and even chocolate, when drunk very strong, are capable of causing diuresis, purging, and vomiting.

[1] Abstract of Bulletin No. 14, U. S. Department of Agriculture, Division of Botany, Edwin M. Hale, M.D., Chicago, Ill.

[2] This was written before Professor Venable's recent investigations.